

CONTACT DUPLICATING & RESEAU PRINTER

AND

HIGH RESOLUTION STEP & REPEAT PRINTER

FIFTH MONTHLY LETTER REPORT

December 10, 1964

Period: November 1, 1964 to December 1, 1964



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TABLE OF CONTENTS

<u>Section No.</u>		<u>Page No.</u>
1.0	<u>CONTACT DUPLICATING AND RESEAU PRINTER</u> . .	1
	1.1 <u>Purpose</u>	1
	1.2 <u>Activity of this Report Period</u>	1
	1.3 <u>Plans for Next Report Period</u>	2
	1.4 <u>Problems</u>	3
	1.5 <u>Documentation</u>	3
2.0	<u>HIGH RESOLUTION STEP AND REPEAT PRINTER</u> . .	5
	2.1 <u>Purpose</u>	5
	2.2 <u>Activity of this Report Period</u>	5
	2.2.1 <u>Electronic Control</u>	5
	2.2.2 <u>Film Gate</u>	5
	2.2.3 <u>Exposure Control</u>	6
	2.2.4 <u>Film Frame Identification</u>	6
	2.2.5 <u>Film Handling</u>	7
	2.3 <u>Plans for Next Reporting Period</u> . . .	7
	2.4 <u>Problems</u>	7
	2.5 <u>Documentation</u>	7
	2.6 <u>Questions Outstanding</u>	7
3.0	<u>STATUS OF FUNDS</u>	9

1.0 CONTACT DUPLICATING AND RESEAU PRINTER

1.1 Purpose

The overall objective of the current contract is the design, fabrication, test, and delivery in fifteen months of a photographic Step and Repeat Contact Duplicating & Reseau Printer. Prime design goals are high speed automatic operation, variable format capability, and high resolution with minimum film distortion or damage. The deliverable equipment will be suitable for operational use. The Printer will accommodate films of 70 mm to 9-1/2" width with frame lengths up to 30 inches, and will offer operation in the Reseau mode as an option.

1.2 Activity of this Report Period

Primary activity of this report period has been the completion of the Design Plan report, paralleled by breadboard experiments to confirm the recommended solutions contained therein.

Actual tests on the breadboard unit have successfully demonstrated the DC motor and magnetic particle clutch technique for both film transports. Further development is directed toward lowering the transient film stresses with continuous adjustment of torque as the film spool diameter varies.

Photoelectric means for advancing duplicating film and for sensing negative frames have been incorporated into the unit.

In conjunction with operation of the air-pressure pad and the exposure source, wiring of all components has been completed so that automatic cycling of all functions is now possible.

The multiple lamp-bank and honeycomb collimators are now being installed in the breadboard unit in preparation for a preliminary photographic test program which is expected to demonstrate resolution and uniformity of illumination. A secondary breadboard is currently being fabricated to evaluate exposure sources and various methods for platen illumination. A photoelectric circuit for Automatic Exposure Control will be included in the mock-up before multiple circuits are fabricated for inclusion in the breadboard unit.

Investigation of the Reseau grid fabrication problem is continuing with two manufacturers to determine optimum means for producing grid lines and to resolve specification details prior to release of a purchase order. Preparation of the Design Plan is now complete as well as the Industrial Design renderings and objective board. A preliminary copy of the Design Plan and layout drawings were reviewed with the program technical monitors on November 20, 1964, and final publication is currently under way.

1.3 Plans for Next Report Period

Following the preliminary photographic tests on the breadboard unit, a second series of tests will be performed to evaluate and demonstrate full-scale operation with Automatic Exposure Control. Simulated aerial negatives constructed of multiple arrays of step-wedges will be used, as well as high resolution targets. Sample Reseau grid lines will also be contact printed. With a firm plan in mind for the Pre-View & Punch Station, lay-out drawings will

be generated to determine configuration and spacing of the magnifying viewers and associated punches, as well as the design of the Reseau grid binding frame and locator pins.

Tentative selection of specific electrical components with consideration of RFI Suppression is under way.

1.4 Problems

No major problems to delay scheduled progress have occurred or are forecast. Some of the important considerations to be resolved are optimum thickness of the Reseau grid platen with regard to allowable deflection under contact printing pressure, and the importance of inherent imperfections in glass manufacture. Optimum degree of collimation of the exposure source is another critical consideration to achieve resolution without systematic patterning.

1.5 Documentation

The following items were resolved during the Design Plan review meeting held with the program technical monitors on November 20, 1964.

1. Paragraph 3.6. Synchronous motion of negative and duplicating film implies concurrent advance, but not synchronism of film speeds for any purpose.
2. Reseau lines are tentatively proposed to print out "white", but may be "black" if advantages can be demonstrated.
3. Exhaust air from the Printer need not be refiltered, but may be ducted back into the recirculatory system of the facility for reprocessing.

4. There will not be a requirement for printing 2-1/4" x 2-1/4" frames individually. The smallest increment of negative advance shall be 4-1/2" minimum.

2.0 HIGH RESOLUTION STEP AND REPEAT PRINTER

2.1 Purpose

The purpose of this effort is to design, fabricate, test and deliver in twenty months a high-precision Step and Repeat Photographic Contact Printer. This Printer will be capable of producing photographic contact prints of the highest possible quality, resolution and acutance from roll films of width varying from 70 mm to 9-1/2" up to a maximum of 30 inches. This program will include a six-month Feasibility Study and Design Analysis, followed by a Breadboard Phase. Following design approval, a prototype Printer will be produced in accordance with the Design Plan.

2.2 Activity of this Report Period

2.2.1 Electronic Control

The Electronic Control study of all subsystems, except the Exposure Control Subsystem, has been completed. Control Panel changes as discussed at the November design review meeting are incorporated, and the control panel layout drawing is being updated.

2.2.2 Film Gate

Resolution tests with open and plastic gates indicate resolution of 400 lines per millimeter can be achieved. Step wedges will be used for gate evaluation of exposure control. A test configuration has been designed and step wedges have been ordered.

Anti-reflection coatings on glass have been received and tests are being conducted to evaluate this method of reducing Newton fringes which occur between the negative and glass gate. Designs for a breadboard gate have been initiated.

2.2.3 Exposure Control

An electronic dodging system utilizing CRT beam modulation has been analyzed and found to be unfeasible for a 9 x 30 format within the machine speed and film requirements of the system. Compromise systems are being studied to determine the optimum achievable results with electronic CRT scan techniques. A back-up slit scan utilizing a moving light source is being investigated in conjunction with the light source study. Investigations involving spectral match with film characteristics, rate and degree of illumination modulation and sensitometric analysis are expected to be concluded. A final system configuration and initiation of the breadboard design is being planned for the next period.

2.2.4 Film Frame Identification

Optical density tests of unexposed film of the types to be used in the printer have been conducted. These tests indicate that photoelectric sensing by means of selective transmission through both the negative film and the unexposed film is possible. A photocell has been selected for the film reader and breadboard design has been initiated.

2.2.5 Film Handling

Layout of the film transport breadboard has started. The breadboard structure will be capable of subsequently housing other major printer components for feasibility testing. Transport component selection and purchasing will commence during the next reporting period.

2.3 Plans for Next Reporting Period

2.3.1 It is anticipated that the feasibility study will be concluded and the Feasibility Report will be prepared.

2.3.2 Additional breadboard layouts will be started and component selection and purchasing will be initiated.

2.4 Problems

Project clearances have been obtained and an early meeting with the procuring technical personnel is required to discuss the details of film coding and exposure control.

2.5 Documentation

A revised list of specification changes was discussed with the technical monitor and approved at the design review meeting held at [] on 23 November 1964.

2.6 Questions Outstanding

2.6.1 List of spool sizes and formats to be furnished by the technical monitor.

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2.6.2 Document procurement to be furnished by the technical monitor.

Rec'd 26 Apr 65

✓AD-438 418 Density Discrimination for Printer Utilization Study

Request 5 Apr 65

Rec'd 26 Apr 65

AD-439 600L Test and Evaluate the Kalvar 70 MM and 5 Inch Roll to Roll Contact Printer Processor (EN-85) *DOD only*

Request 25 Apr 65

Rec'd 26 Apr 65

✓AD-430 315 Test and Evaluation of 70 MM Film Processor - January 7, 1964 *DOD only*

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Request 15 Apr 65

Rec'd 26 Apr 65

✓AD-426 996 A Continuous Tone Diazo Reproduction System - September 3, 1963

Rec'd 26 Apr 65

✓AD-405 915 Printer Contact Photographic EN 39 - December 1962 *DOD only*

Rec'd 26 Apr 65

✓AD-293 047 Test and Evaluation of USAF 70 MM Roll Film Printer EN 31 August 1962 *DOD only*

Del'd. to Herb B. on 13 Apr 65

7

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